This is a guidance document which was made for the U.S. General Services Administration ARRA PMO for standardization. Any use of this content would need to be edited for applicability to the specific agency and project goals.

Attachment X

Statement of Work

This Statement of Work document is part of a set of documents to be used for all ARRA relighting projects. This must be used in coordination with expert oversight of the contracted Lighting Designer. The Lighting Designer must meet GSA's Lighting Designer oversight criteria. This document is an attachment to the Commercial Item for Construction Contract. This Statement of Work document must have the applicable specification attachments for the specific project scope.

Remove sections in this document that do not apply to the project scope.
Edit this document based on the blue guidance text.

Contents

I. PROJECT IDENTIFICATION

1. PROJECT TITLE:
2. BUILDING:
3. LOCATION:
4. PROJECT CONTROL NO.:
5. GSA WORK ITEM NO.:
6. ESTIMATED CONTRACT AWARD AMOUNT:

II. BACKGROUND

This lighting project is being implemented under the American Recovery and Reinvestment Act (ARRA). The overall objectives are to reduce energy consumption and improve the quality of lighting for building occupants.

III. PROJECT DESCRIPTION

Project Description:

This project is for the relighting of *[Insert general project description background including the following topics and key pieces of information:*

- *Describe the aspects of this project that are not business as usual. E.g., relighting in place, best practices, new controls wiring, expectations related to attached specification, etc.*
- *Describe the role of the GSA appointed lighting consultant (Designated Representative or Designated Lighting Expert Representative, listed throughout).*
- *Describe the chronology of expected events—mention the fact that there has already been a walkthrough where the lighting design system has been decided, drawings were identified (or an exception is allowed), ceiling tile replacement identified, etc.*
- *One review cycle is expected—to ensure that project plans are achieving national consistency per GSA and PMO, it will be reviewed by GSA or Designated Lighting Expert Representative.*

*[*Insert *broad project description, to include the overall design strategies, fixture types selected, etc. Describe the extent to which design has been complete, and level of design effort to be performed by the design-build contractor (in this section describe in general terms)]*

[Insert project-specific information about the building and scope, based upon the survey of existing conditions.]

Work to be performed is done on a limited design-build basis. The Contractor shall complete a mockup for each major type of space, and upon completion of each mockup to the satisfaction of GSA shall complete specifications, drawings, product submittals, schedule and photometric analysis for GSA approval based on the approved mockup. Complete fixture layouts for spaces beyond the mockup space are not required, as this will be detailed through a series of walk-throughs to detail exact fixture locations as work progresses. The design submittal must include a description of how various space types which present variations from the mockup space will be accommodated.

If the mockup(s) cannot be completed to GSA's satisfaction, GSA may pay the price of the mockup in accordance with the price schedule, and terminate additional work at no additional cost to GSA.

[Indicate whether GSA is providing replacement ceiling tiles where tiles are damaged or must otherwise be replaced. If ceiling tiles are being replaced, be sure to include specifications requiring that if recessed troffers are the primary luminaire, the ceiling must be at least 80% reflective and must easily accommodate 2x4 luminaires, and if suspended luminaires are the primary luminaire, the ceiling must be at least 90% reflective. Do not go into details here, this should be addressed elsewhere]

IV. GENERAL REQUIREMENTS

[Editor should reference the specifications that are pertinent for this project scope from the following list: Interior Lighting, Interior Lighting Control System, Bi-level Lighting for Stairwells and Corridors, LED Parking Lot Lighting, Parking Garage Lighting]

[Ceiling tile replacement is required in any project areas where the existing ceiling does not currently meet reflectance criteria stated below. Existing tiles may have lost reflectance due to dirt, stains or age.] ***The GSA designated lighting expert may provide a characterization of areas that require ceiling tile replacement as part of the survey of existing conditions.*** *If the work includes ceiling replacement, indicate all areas where ceiling tiles must be replaced so that bids include these costs, and be sure that appropriate specifications are incorporated as an attachment and referenced in the list above. Ceiling specifications must require that if recessed troffers are the*

primary luminaire, the ceiling must be at least 80% reflective and must easily accommodate 2x4 luminaires, and if suspended luminaires are the primary luminaire, the ceiling must be at least 90% reflective.]

The Contractor must have a punch list crew available on each weekday morning after work has been performed to immediately address complaints, and to inspect the work with the GSA project manager or other GSA representative.

[Indicate available storage space and staging areas, and rules on availability of parking and use of loading dock]

V. DESIGN CRITERIA

1. Interior Lighting

The primary luminaire selections for the office work areas of this project are indicated below.

Requirements for non-office areas such as conference rooms, corridors and other areas are also provided below.

[The choice between options 1, 2, or 3 for the primary luminaire selection will be made based on an evaluation made by GSA with input from designated lighting experts based on a survey of existing conditions. *Language for each of the three options is included below; delete the options that are not relevant to this project.]*

- **Option 1— Workstation-specific lighting using dimmable ballasts and occupant dimming control:** This lighting system is has one luminaire suspended above each workstation with separately controlled uplighting and downlighting. The uplighting is controlled by the facility and the downlighting is controlled by the occupant. Uplighting controls include daylight dimming, demand response opportunity, scheduling and zone control. Downlighting has an occupancy sensor tuned to each workstation and personal dimming control by the occupant. The system provides detailed energy consumption data reports and can assist maintenance by producing feedback for lamp outages.
- **Option 2— Task/Ambient:** This lighting approach uses direct/indirect suspended pendants in continuous rows supplemented with local workstation task lighting (under cabinet lights and desk lamps). This system may be used with dimming ballasts and controls that allow individual customization of light levels in enclosed offices and zoning controls for groups, daylight harvesting and load shedding.
- **Option 3— Recessed high performance troffers with a non-planar lens:** High performance troffers save more energy than either

parabolic or flat lensed troffers. The word non-planar refers to a fairly new style of luminaire that uses curved or angled lenses to improve light distribution. Specific photometric requirements are found in the attached performance specifications. This system may be used with dimming ballasts and controls that allow individual customization of light levels in enclosed offices and zoning controls for groups, daylight harvesting and load shedding.

[If Option 2 Task/Ambient selection is indicated, add the following paragraphs if there office areas within the project with ceiling heights of 8 foot 4 inches or less. Otherwise, delete this language.]

If the task/ambient lighting solution is to be used in applications with ceiling heights lower than 100 inches, or where the stem length must be shorter than 16 inches the following requirements must apply:

(1) Specify a pendant direct/indirect luminaire specifically designed for low ceiling mounting, as described in the Interior Lighting specifications and applicable luminaire schedules.

(2) Where ceiling conditions of such low ceilings occur in less than 15% of the project area, and pendant direct/indirect luminaires are appropriate for the remainder of the space, modification of the uplight portion of the primary direct/indirect luminaire used elsewhere may be submitted for mockup and review.

(3) Luminaires submitted for such applications are required to be demonstrated in a mockup.

Primary Luminaire Selection for Interior Lighting – Open Plan Workstation Areas

[Insert language for Option 1, 2 or 3 based on input provided by GSA designated lighting experts based on a survey of existing conditions.]

2. Primary Luminaire Selection for Interior Lighting – Private Offices

[Insert language for Option 1, 2 or 3 based on input provided by GSA designated lighting experts based on a survey of existing conditions.]

3. Additional Luminaire Selections for Interior Lighting – Non-office areas

[Insert criteria for non-workstation areas based on input provided by GSA designated lighting experts based on a

survey of existing conditions. *Criteria for conference rooms and office corridors will typically include specific luminaire criteria and will be included in the attached interior lighting specification.]*

Conference Rooms: ***[input to be added from GSA designated lighting expert based on survey of existing conditions****]*

Corridors and core walls: ***[input to be added from GSA designated lighting expert based on survey of existing conditions****]*

Additional non-work areas: The Contractor is required to design and select the lighting for non-workstation areas that do not have specific criteria indicated here or in attached specifications, as described in design task work below. Other luminaire types must be added as needed to achieve proper lighting quality criteria including but not limited to downlights, wall washers, wall sconces, etc. Lighting must comply with IESNA quality criteria as specified in DG-18 and must also comply with the energy savings objective listed below.

[NOTE: Detailed criteria for ancillary spaces such as elevator lobbies, break rooms, equipment rooms will not always be specified by the lighting expert. In such cases the Contractor is expected to design and select the lighting.]

4. Performance Objectives.

   a) The electric lighting installation must be able to provide a minimum maintained average illuminance of 450 lux (42 FC) utilizing both task and ambient sources at the working surface (30 inches AFF in open-plan and enclosed offices). Additionally, the installation must be able to provide a minimum maintained average illuminance of no less than 300 lux (31 FC) across the working surface from permanently fixed luminaires without the use of furniture mounted task lighting

   b) Design must meet the engineering standard of care as defined by the Chapter 10 Lighting Design Guide, 9th edition IES Lighting Handbook (2000). Incorporate design principles illustrated in application examples #__ and # __ of the IES DG-18-2008 “Light + Design: A Guide to Designing Quality Lighting for People and Buildings.” This must include but is not limited to: provide adequate room surface brightness on the ceiling, walls, and work surfaces; reduce overhead, direct and reflected glare; and provide personal control

for occupants using either workstation-specific dimmable overhead lighting or local task lighting.

c) The design must achieve a minimum energy efficiency objective, for the entire lighting system including task, accent, and decorative lighting, of reducing energy consumption by 30% below the space-by-space lighting power densities of ANSI/ASHRAE/IESNA Standard 90.1-2007.

5. Zone and Controls Configuration – Daylighted Areas

a) Separately control all luminaires within 15 feet of windows or within 7 feet of skylights (the daylighted zone) from luminaires outside of daylighted zones. Separately control luminaires closest to the daylight aperture from luminaires farther from the daylight aperture, within the daylight zone. Alternately, daylighted areas may be as defined in ASHRAE/IESNA Standard 90.1-2007, Addendum ab.

b) Provide daylight harvesting controls for all luminaires within the daylighted zone, except for those locations where it can be clearly demonstrated that daylight is inadequate or obstructed, or when daylighting is not sufficient to replace electric installed lighting for at least 1000 full-load hours during daylight hours per year.

c) Provide smooth and continuous daylight dimming for daylighted zones with occupied work stations. Daylight system may be designed to turn off ambient lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

d) Program daytime set points for total illumination (combined daylight and electric light) level that initiate dimming to be not less than 150% of the nighttime maintained designed illumination levels.

e) Multiple-leveled switched daylight harvesting controls may be used in lieu of continuous dimming controls for non-work areas that are not visible by occupants in work areas, or are located at least 50’ from work areas.

6. Zone and Controls Configuration – Non-Daylighted Areas

a) Zone sizes for non-daylight controls: Lighting control zones must not exceed 100m2 (1,100 sf) or one building bay, whichever is smaller.

b) All open-plan offices must have luminaires equipped with continuous dimming ballasts capable of dimming to 10% or lower of full output.

c) All enclosed office, training rooms, conference rooms, lecture halls, meeting rooms, lunch and break rooms must be capable of reducing light levels down to at least 10% using continuous dimming or at least 50% using multi-level switching.

d) Control system programming must not allow luminaires or portion of luminaires providing ambient lighting to the space and vertical surfaces to be controlled by occupant or vacancy sensors of individual workstations.

e) In spaces utilizing pendant workstation-specific luminaires, the ambient uplighting component must be zoned and controlled as a general, space-wide lighting system. Control system must not allow luminaires or portions of luminaires providing ambient uplighting or lighting for vertical surfaces to be controlled by occupant or vacancy of individual workstations. Only the occupant can control the downlight component dedicated to their specific workstation.

f) Occupancy/vacancy sensors must not be used to turn off ambient lighting in response to the vacancy of individual workstations. Extinguish ambient lighting only when all workstations in a zone are vacant.

g) Occupancy/vacancy sensors with manual-on functionality must be used in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and automatic-on occupancy sensors are more appropriate. Provide occupancy/vacancy sensors for enclosed offices, conference rooms, meeting rooms, and training rooms. For spaces with multiple occupants or where line-of-sight may be obscured, provide ceiling- or corner-mounted, or luminaire-integrated sensors with manual-on switches. For workstation-specific open plan systems, use occupancy sensors without manual on.

h) Design control system to respond to utility-generated signals. In declared utility power emergency events, ambient illumination levels in work areas must not decrease more than 50% below design light levels, unless local or dedicated task lighting is available to the workers, in which case the ambient illumination levels may be decreased as much as 80%. Lamps

dedicated to task lighting in “workstation specific” luminaires must not be dimmed more than 20% below occupant selected illumination levels during such declared power emergencies.

i) In non-emergency situations intended to shed load during peak summer demand periods, ambient lighting may be reduced up to 25% as long as local or dedicated task lighting is available to the workers. Lamps dedicated to task lighting in workstation-specific luminaires, or local task lights must not be reduced under non-emergency conditions.

j) In non-work spaces, illumination levels may be reduced in response to declared utility demand emergency events, as determined by the Owner in consultation with the GSA / Tenant, as long as such levels are appropriate for safety and meet all relevant codes.

k) Conference, meeting, training, auditoriums, and multipurpose rooms must have controls that allow for independent control of each local control zone. Rooms larger than 300 sq.ft. must instead have at least four (4) pre-set lighting scenes unless otherwise specified. Such multiple scene controls must include a 0-60 second fade rate option. Provide occupancy/vacancy sensors to extinguish all lighting in the space. It must not be acceptable for the system to automatically turn on the last preset selected. Such multi-zoned controls must require manual selection of a pre-set or zone to turn on lights in the space. In non-daylighted spaces, it must be acceptable to allow an occupancy sensor to turn on a designated preset or zone representing the lowest wattage grouping in the space.

l) In large meeting, training, auditoriums, or other such spaces, provide appropriate interfaces such as RS232 for audio-visual interaction, and DMX control for LED or theatrical controls, as needed for the specific project.

m) In meeting spaces with movable dividing partitions, provide a means to combine /divide lighting of multiple spaces by means of the lighting control system (wall station keypad or remote access) independent of partition location. Controlling device must visually indicate the room control status.

7. Control Criteria for Workstation Specific Lighting

a) Workstation-specific lighting must provide both ambient uplighting and a separately controlled downlight from individual suspended pendant luminaires mounted in immediate proximity to each workstation. Lamps designated for the uplight function and the downlight function must be separately controlled, and compartmentalized as necessary to reduce distraction of lamps operating at different output over different workstations. Luminaire must utilize either three T8HP fluorescent lamps or three T5 fluorescent lamps. T5HO lamps are not permitted because of their low efficacy and requirements for shielding.

b) Control the downlight and uplight components separately in the following manner:

i. Refer to interior lighting control specifications *[Attachment __]* for communication protocol requirements.

ii. Integrate an occupancy sensor sensitive to workstation occupancy and vacancy into the fixture's design and operation for open plan office environment. Private office may be controlled with ceiling or wall-mounted occupancy sensors.

iii. In open plan areas, occupancy sensors integral to fixtures must reliably detect workstation occupancy/vacancy without false triggering due to movement outside the workstation. Occupancy sensor input shall result in the dimming of the ballasts to 'off' due to vacancy after a preset or smart time delay, with a fade rate of 60 seconds, and an increase of illumination to full on due to occupancy, with a raise rate of 15 seconds.

[Indicate here or in Lighting Control specifications if workstation specific downlight is to be turned off (recommended for high partitions) or to lowest dimmed setting (recommended for low partitions). ***Input on this choice may be provided by a GSA designated lighting expert.****]*

iv. In enclosed offices, the occupancy sensor must be capable of distinguishing office occupancy and vacancy from adjacent corridor traffic.

v. Occupancy sensor must meet the criteria and performance of the GSA Interior Lighting Control System Specifications.

vi. The occupancy sensor must be capable of controlling the downlight lamp.

vii. In open plan offices a photosensor sensitive to light reflected from the viewed plane must be integrated into the fixture's design and operation.

viii. In enclosed offices, either luminaire-based or architectural-mounted sensors are acceptable. Photosensors are not required in fixtures located outside daylighted areas.

ix. User should be able to set their preferred light level for their workstation's "task component" using one of the following:

[Editor may wish to indicate the preferred method here or in the attached specifications. ***Input on this choice may be provided by a GSA designated lighting expert.****]*

i. Computer based solution as designed and implemented by GSA

ii. Handheld Personal Digital Assistant

iii. RF or IR Wireless Remote

iv. Other method acceptable to GSA

x. The control photosensor must be capable of automatically regulating the light intensity of at least the "ambient" component.

xi. The control photosensor and associated controls and user interface must be designed so that the minimum task light level (horizontal illuminance at 30 inch desk height) in the workstation can be set by the occupant and the electric light modulated to maintain that level or higher regardless of external light sources including daylight.

xii. If luminaires are able to be connected as part of a digital network, lighting must be controllable from a central location with relative lighting adjustments, i.e. the

facility manager should be able to centrally adjust levels of light from their "current" levels, for example, reducing all ambient uplights by 30% of their current settings and all task lights by 10% of their current settings. The facility manager must have this ability on a global basis using the software provided.

8. Software Usability Criteria for Lighting Controls

a) The front-end software for the lighting controls must be accessible for building managers and maintenance personnel to easily use and adjust. The software must employ a GUI interface with graphical layouts based on furniture plans. A menu system must be employed to find all major function. An operator must be able to configure (i.e., changing timeout settings, etc.) from the GUI interface.

b) The computer-based software for occupant personal control must be able to operate without noticeable delays on a standard personal computer with Windows XP Professional.

c) For workstation-specific lighting controls, the Contractor must cooperate with the GSA 's designated representatives, to include other contractors, in developing methods of access to the system by occupants.

2. Parking Garage

The following criteria apply to lighting in parking structures and underground parking.

1. Energy Conservation Design Targets

Lighting within the parking structure (excluding dedicated emergency lighting) shall not exceed a maximum of 0.225 Watts per square foot lighting power density (LPD).

a) A target LPD of 0.18 Watts square foot is desired.

b) Through the use of select controls, either occupancy or daylighting based, the lighting system shall be designed to save at least 20% energy compared to the calculated design peak load (total installed power times the full operating schedule) of the garage lighting.

2. Source Selection

    a) Use fluorescent in locations where there are less than 70 days per year with a minimum temperature of 32 degrees Fahrenheit or less.

3. Lighting Requirements

Maintained minimum horizontal illuminance of 1.25 fc. Maintained vertical illuminance of 0.5 fc at 5 feet AFF Variation in horizontal illuminance points shall have a max:min ratio of 10:1 or less. This corresponds to an average-to-minimum illuminance ratio of 4:1 or a maximum-to-minimum illuminance ratio of 7:1.

4. Installation: Follow manufacturers' recommended installation procedures.

5. Testing and Commissioning

    a) Ultrasonic sensors should have their sensitivity adjusted when interference from air movement is at its maximum.

    b) After all sensitivity and time adjustments are made to the integrated sensor and after every lamp change, the lamp conditioning circuit should be activated. See manufacturers' installation documents for exact procedure.

3. LED Parking Lot

    1. Energy Conservation Design Targets:

        a) Site lighting shall meet the following lighting power density (LPD) requirements:

            i. Lighting Zone 1 –Lighting Power Density maximum of 0.04 Watts per Square Foot

            ii. Lighting Zone 2 – Lighting Power Density maximum of 0.05 Watts per Square Foot

            iii. Lighting Zone 3 – Lighting Power Density maximum of 0.06 Watts per Square Foot

            iv. Lighting Zone 4 – Lighting Power Density maximum of 0.08 Watts per Square Foot

        b) Site lighting uniformity calculations shall not include facade lighting and/or building security lighting contributions.

    2. Lighting Requirements

        a) Site Lighting Requirements – Main Parking Area

i. Defined as the group(s) of parking spots comprising the majority of the site. The zone starts from the edge of the front aisle and extends to the center of the last driving lane

ii. Illuminance requirements of area:

Table 1. Main Parking Area

	Minimum Horizontal Illuminance	Uniformity Ratios	Minimum Vertical Illuminance
Lighting Zone 0	N/A	N/A	N/A
Lighting Zone 1	N/A	N/A	N/A
Lighting Zone 2	0.50 FC	max:min ratio of 10:1 or less	0.25 FC
Lighting Zone 3	0.75 FC	max:min ratio of 10:1 or less	0.50 FC
Lighting Zone 4	1.00 FC	max:min ratio of 10:1 or less	0.50 FC

iii. Vertical illuminance in the center of Main Parking Area shall be taken at 5 feet Above Finished Grade (AFG) in all four cardinal directions

b) Site Lighting Requirements – Perimeter Parking Areas

i. Defined as the group(s) of parking spots on the perimeter of the site. The zone starts on the center of the farthest driving lane and goes to the boundary of the site.

ii. Illuminance requirements of area:

Table 2. Perimeter Parking Area

	Minimum Horizontal Illuminance	Uniformity Ratios
Lighting Zone 0	N/A	N/A
Lighting Zone 1	N/A	N/A
Lighting Zone 2	0.20 FC	max:min ratio of 10:1 or less
Lighting Zone 3	0.40 FC	max:min ratio of 10:1

		or less
Lighting Zone 4	0.50 FC	max:min ratio of 10:1 or less

c) Site Lighting Requirements – Front Aisle

i. Defined as the driving/walking area from the façade of the building to the exterior edge of the nearest parking spot(s)

ii. Illuminance requirements of area:

Table 3. Front Aisle

	Minimum Horizontal Illuminance	Uniformity Ratios
Lighting Zone 0	N/A	N/A
Lighting Zone 1	N/A	N/A
Lighting Zone 2	1.00 FC	max:min ratio of 10:1 or less
Lighting Zone 3	1.50 FC	max:min ratio of 10:1 or less
Lighting Zone 4	2.00 FC	max:min ratio of 10:1 or less

d) Site Lighting Requirements – Entry Drives, Bale and Loading Areas, Rear Drives

i. Entry drive defined as the roadway for entering and leaving the parking lot. The zone starts at the end of the public road and ends where the perimeter parking zone starts.

ii. Loading area defined as the roadway along the façade where loading and unloading for the building occur

iii. Rear drive defined as the roadway behind the building, where customer parking does not occur, and extends from the façade of the building to the edge of the site

iv. Illuminance requirements of area:

Table 4. Entry Drives, Loading Areas, Rear Drives

	Minimum Horizontal	Uniformity

	Illuminance	Ratios
Lighting Zone 0	N/A	N/A
Lighting Zone 1	N/A	N/A
Lighting Zone 2	0.20 FC	max:min ratio of 10:1 or less
Lighting Zone 3	0.40 FC	max:min ratio of 10:1 or less
Lighting Zone 4	0.50 FC	max:min ratio of 10:1 or less

e) Site Lighting Requirements – Spill Light Control (Light Trespass)

i. The Lighting System shall produce less than the vertical illuminance listed in the table below at a point 5 feet AFG along the site boundary normal to the site per each Lighting Zone [to model in software create a continuous line around the perimeter of the parking lot that looks into the parking lot]:

Table 5. Site Lighting Trespass Maximum Vertical Illuminance Values

Lighting Zone	Maximum Illuminance
Lighting Zone 0	0.05 FC
Lighting Zone 1	0.10 FC
Lighting Zone 2	0.30 FC
Lighting Zone 3	0.80 FC
Lighting Zone 4	1.50 FC

f) Security issues may require light levels exceeding recommendations in A through F; this must be determined during design through discussions with Owner. If necessary reference IESNA document G-1-03, section 4. If all the requirements are met in G-1-03, use an LPD multiplier of 1.50 for each of the Lighting Zones (LZ), or adjust multiplier as necessary to accomplish the required lighting level.

VI. QUALITY CONTROL CRITERIA

1. Interior Lighting

    1. Requirements and System Performance

    All requirements of the attached specifications *[list attachments with titles—NOTE that both luminaire and controls specs must always be used when interior lighting is part of the project]* must apply, including but not limited to:

        a) Submittals
        b) Quality Assurance
        c) Warranty
        d) Software
        e) Extra Materials
        f) Offsite-Technical Support
        g) System and product performance

    2. Substitutions:

    The performance specifications herein including attachments *[list attachments with titles]* form the basis of design. Furnish equipment that meets every criterion of the performance specifications and the characteristics of the specified system.

    3. Submittals, Shop Drawings and Samples

        a) Submittals are required as listed in detail in the attached specifications. [reference name and title of attachment]
        b) Submit shop drawings to GSA or Designated Representative XX days [region to populate based on project schedule to avoid potential lead time issues causing product substitutions after award of contract. Clearly indicate manufacturer's lead times for fabrication of all components. After receipt of shop drawings marked "No Exceptions Taken" or "Make Corrections Noted," Contractor shall release the lighting control systems for fabrication and forward to the Architect and GSA verification that the lighting control systems have been released for fabrication and a guaranteed shipment date for each component.
        c) All samples shall be received by the GSA or Designated Representative within a timely manner after Contractor's receipt of shop drawings marked "No Exceptions Taken" or "Make Corrections Noted."
        d) After Contractor's receipt of shop drawings marked "Revise and Resubmit" or "Rejected", Contractor shall resubmit revised shop drawings to the GSA or Designated Representative, in accordance with the General Requirements regarding re-submissions.

e) Contractor shall notify the GSA or Designated Representative of potential scheduling problems, or of submittals that have not been returned to the Contractor which are required to maintain the installation schedule. Such notification shall be in a timely manner and well in advance of the time such delay might affect the fabrication schedule or appropriate delivery of lighting control system components. Manufacturer's lead times shall not be a justification for substitutions

2. Parking Garage Lighting

[Delete this section if Garage Lighting is not part of this SOW.]

1. System Performance

All aspects of the attached specifications *[list attachment and title]* must apply, including but not limited to submittals, warranty, system and product performance.

2. Samples and Testing

Provide standard production model luminaire samples identical (including LED package) to product proposed to be installed for inspection. Provide independent testing of sample luminaires to verify luminaire performance and compliance with the specifications. Testing shall be conducted per the applicable IESNA and ANSI approved methods for products using Solid-State Lighting (SSL) sources. Refer to the DOE SSL web site for a list of approved test laboratories at www1.eere.energy.gov/buildings/ssl/test_labs.html).

3. LED Parking Lot Lighting

1. System Performance

All aspects of the attached specifications *[list attachment and title]* must apply, including but not limited to submittals, warranty, system and product performance.

2. Samples and Testing

Provide standard production model luminaire samples identical (including LED package) to product proposed to be installed for inspection. Provide independent testing of sample luminaires to verify luminaire performance and compliance with the specifications. Testing shall be conducted per the applicable IESNA and ANSI approved methods for products using Solid-State Lighting (SSL) sources. Refer to the DOE SSL web site for a list of approved test laboratories at http://www1.eere.energy.gov/buildings/ssl/test_labs.html).

[Delete this section if Garage Lighting is not part of this SOW.]

VII. DESIGN PHASE REQUIREMENTS

1. Task 1. Lighting Design Conceptualization

1. Conferences with the GSA as required to discuss lighting design criteria, system concepts, project cost guidelines, schedule parameters and other elements within this SOW and attachments.
2. Evaluation of the GSA´s lighting design criteria for this project, all requirements in this SOW, performance specifications (attached), and survey of the GSA´s existing facilities. For certain project areas, GSA has retained conceptual input from a GSA based on survey of existing conditions and has included that guidance in this SOW and attachments. **Detailed lighting and controls requirements for interior office work areas, interior stairwells, exterior parking lots, and exterior parking garages *[remove references to exterior if not included in this project]* are found in attached specifications and are included in task work by reference.** Make final conceptual design decisions based on established requirements and in collaboration with GSA.
3. Areas where conceptual requirements have not been determined in the SOW or attached specifications conceptual design development will be required to be developed by the Contractor. Analysis of lighting requirements for visual tasks to be performed by the occupants is required for these project areas, and requirements for the lighting systems must be based on quality criteria as per the IES DG-18-2008 “Light + Design: A Guide to Designing Quality Lighting for People and Buildings” publication.
4. Submittal of a Conceptual Basis of Design narrative outlining the recommended program for lighting and lighting controls for all project areas, for review and approval by the GSA. The Control Intent section of the to include a written description of the design control intent. Discuss and determine basic control settings for inclusion in the Control Intent Narrative:
    a) Initial sensor and switching zones
    b) Initial settings for control devices
    c) Initial pre-set scenes (if applicable)

d) Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, set points, etc.

2. Task 2. Design and Installation of Mockup Spaces for Interior Lighting

    1. Mockup shall be at a location and of a size determined by the GSA.
        a) Mockup shall be held in a space that has the same ceiling height, finishes, workstation heights and layouts as the proposed project space.
        b) Contractor shall provide at least four (4) luminaires and installation services by a qualified installer.
    2. Prepare designs for Interior Lighting mockup spaces with documentation to include:
        a) Perform point-by-point electric lighting calculations using independent industry standard software. Lighting calculations must use the appropriate light loss factors as indicated in the attached technical specification. Where LLF's are not indicated, use appropriate light loss factors defined by the IESNA, and workstation partitions must be included in the model.
        b) Scaled lighting layout plans for the mockup spaces indicating fixture types, locations, control zones, control schematic (wiring diagrams, description of operation), and emergency power wiring. The designer will coordinate this work with the GSA. These will be executed on backgrounds provided by the GSA.
        c) Verification of ceiling conditions in order to furnish appropriate mounting details for each luminaire. Where work is to be flush or concealed, verify that it does not project beyond the finished lines of floors ceilings or walls. Submit fixture mounting details with design documents.
        d) Preliminary details of special lighting treatments.
        e) Preliminary layouts, single-line diagrams and specifications for lighting control systems.
        f) Preliminary lighting fixture schedule, catalogue cuts and specifications.
    3. Construct mockups of approved mock-up designs..

3. Task 3. Performance Testing, Documentation and Reporting of Interior Mockup Areas
    1. Contractor shall provide information to, and work with GSA and GSA designated independent lighting design specialist in evaluating the lighting mockup.
    2. Mockup shall be evaluated for evidence of the following qualitative characteristics that will disallow the product from use on the project: direct glare leaving the luminaire at high angles (55 – 90 degrees) and visible from normal seated viewing angles; reflections in computer screens or monitors; overhead glare and veiling reflections due to exposed T5 lamps or excessive luminance leaving the luminaire at low angles (0-30 degrees); excessive brightness or high contrast from exposed lamps, insufficient diffusion or shielding, specular materials or the like; other quality characteristics that may annoy, distract or disturb the workers, reduce functionality, or create unsafe conditions.
    3. Additional mockups are required for proposed alternative not meeting the exact performance specifications. This shall include shop drawing review, review of operable samples and participation in full-scale mockup.
4. Task 4. Lighting Design and Documentation for Interior Lighting
    1. Based on the mockup results and conceptual design as approved by GSA, develop the lighting design for the remaining project areas and provide documentation of all design tasks to GSA. Include the following documentation:
        a. Perform point-by-point electronic lighting calculations of all typical spaces using independent industry standard software. Submittals must include graphic representations of illuminance levels at the work plane, ceiling and walls for each typical or mockup area. Typical spaces are defined as similar with respect to ceiling height, workstation partition height and size, and room and surface reflectance. Lighting calculations must use the appropriate light loss factors as defined by the IESNA, and workstation partitions and bins must be included in the model.
        b. Alternatively, the requirement for calculations in some cases may be fulfilled by submitting solutions determined by using the USDOE web

tool “Commercial Lighting Solutions for Offices” www.lighting-solutions.org/comlighting/login as long as the ceiling height, partition height, room reflectances and workstation sizes of the project match the base assumptions or adjustment factors inherent in the web tool. These web-based lighting solutions are not expected to be available until October of 2009 but in some cases interim guidance may be obtained from the GSA or Designated Representative.

c. Scaled lighting layout plans indicating fixture types, locations, control zones, control schematic (low voltage wiring diagram, description of operation), and emergency power wiring. The designer will coordinate this work with the GSA. These will be executed on backgrounds provided by the GSA.

[If electronic drawings or Reflected Ceiling Plans are not available, the Contractor must use architectural backgrounds provided by GSA to create drawings showing the locations of the lighting fixtures. Details about available should be provided so the Contractor can anticipate the work involved with preparing additional documentation based on architectural backgrounds. ***The GSA designated lighting expert may provide a characterization of the status of drawings as part of the survey of existing conditions****.]*

i. Layout of fixtures must consider sprinklers and location of HVAC components (e.g., air supplies and returns). To the greatest extent possible develop layouts that work around collisions.

ii. If there is an unavoidable collision with sprinklers or HVAC system components immediately notify the GSA's Representative.

d. Lighting fixture schedule, catalogue cuts and specifications.

e. Verification of ceiling conditions in order to furnish appropriate mounting details for each luminaire type. Where work is to be flush or concealed, verify that it does not project beyond the finished lines of floors ceilings or walls. Submit fixture mounting details with design documents.

f. Details of special lighting treatments.

g. Layouts, single-line diagrams and specifications for lighting control systems. Lighting control system design drawings are required for all project areas including electric riser diagrams and showing circuiting to panels.

h. Control Intent Narrative – Provide written description of the design control intent. Discuss and determine basic control settings for inclusion in the Control Intent Narrative:

i. Initial sensor and switching zones

ii. Initial settings for control devices

iii. Initial pre-set scenes (if applicable)

iv. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, set points, etc.

2. Based on input from GSA , make modifications to design documentation. All modifications must be consistent with this SOW and attached specifications. Clarifications or resolution between differing recommendations will be made by the GSA.

5. Task 5. Lighting Design for Parking Garage Areas

[Delete this task if no garage lighting is included in scope]

Submit drawings showing fixture locations, fixture attachments to structure (show typical details), and provide the following:

1. Computer generated photometric analysis of proposed **DAY 1** (defined as the initial illuminance values), of the lighting installation, submittal should include the following requirements:

a) Provide horizontal illuminance measurements (in footcandles) at grade. Spacing between measurement points should be 10 feet on center.

b) Computer calculation should use the following applicable LLF values: 1.0 LLD and 1.0 LDD.

2. Computer generated photometric analysis of lighting shall include a projection of performance five years from project completion date **(**defined as assuming numerous thousands of hours of operation) of the lighting installation, submittal should include the following requirements:

a) Provide horizontal illuminance measurements (in footcandles) at grade. Spacing between measurement points should be 10 feet on center.

b) Computer calculation should use the LLF values as specified in the attached specification *[Attachment X, "insert name]*.

3. Luminaire photometric reports per IESNA LM-79-08 including: laboratory name, report number, date, luminaire catalog number, luminaire, and light source specifications.

6. Task 5. Lighting Design for Exterior Parking Lot Areas

[Delete this task if no LED parking lot lighting is included in scope]

Submit drawings showing fixture locations, fixture attachments to structures (show typical details), and provide the following:

1. Computer generated photometric analysis of proposed **DAY 1** (defined as the initial illuminance values), of the lighting installation, submittal should include the following requirements:

   a) Provide horizontal illuminance measurements (in footcandles) at grade. Spacing between measurement points should be 10 feet on center.

   b) For compliance with light trespass requirements (see 1.3 F), provide summary of vertical measurements (in footcandles) at 5 feet AFG normal to the site boundary, along the site boundary. Vertical measurements should occur parallel to the pole and ½ the distance between the poles along the site boundary.

   c) Computer calculation should use the following applicable LLF values: 1.0 LLD and 1.0 LDD.

2. Computer generated photometric analysis simulating five years after project completion **(**defined as assuming numerous thousands of hours of operation) of the lighting installation, submittal should include the following requirements:

   a) Provide horizontal illuminance measurements (in footcandles) at grade. Per IESNA LM-64-01, measurement points should be 10 feet on center.

   b) For compliance with site lighting performance vertical illuminance requirements (see 1.3 B-E), provide summary of vertical measurements (in footcandles) at 5 feet Above Finished Grade

normal to the center of the parking lot. Vertical measurements should be taken in the center of the parking lot area.

c) Computer calculation should use the following applicable Light Loss Factors values: 0.70 Lamp Lumen Depreciation and 0.95 Luminaire Dirt Depreciation.

3. Luminaire photometric reports per IESNA LM-79-08 including: laboratory name, report number, date, luminaire catalog number, luminaire, and light source specifications. Report shall contain lumen values in BUG zones per IESNA TM-15-07 and Roadway Type classifications, luminous Intensity, zonal lumen summary, and an iso-footcandle diagram per LM-64-05 as well as documentation that specified standards and test methods were followed.

VIII. CONSTRUCTION PHASE REQUIREMENTS

A. Lighting Equipment Procurement

Lighting equipment must be procured based on approved design phase documents, the requirements listed in this SOW and the attached specifications, and only after approvals have been secured by the GSA. Contractor is responsible for determining and anticipating lead times for all lighting equipment.

B. Equipment Removal and Disposal

The Contractor shall remove existing luminaires based on GSA-approved submittals and as directed by scope of work. All fluorescent and compact fluorescent lamps must be recycled. All other components must be recycled to the greatest extent possible. Dispose other components, including but not limited to ballasts containing PCBs, according to relevant Federal, State, Local, and EPA regulations, or guidelines. Contractor must provide GSA with verification of proper disposal and recycling.

C. Quality Control Criteria

Provide submittals as required by the Quality Control section of this Scope of Work and as listed in the attached specifications *[reference attachment name and title]*.

1. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results.

D. Equipment Installation

Lighting and controls must be installed based upon Quality Control Criteria, agreed upon design phase drawings and per this SOW and attached

specifications including but not limited to sections on examination, installation and coordination.

1. The majority of work is in occupied space, and installation must be performed so as to avoid disruption to occupants. With approved exceptions only, work must be performed at nights or on weekends. The Contractor must have a punchlist crew available on each weekday morning after work has been performed to immediately address complaints, and to inspect the work with the GSA project manager or other GSA representative.
2. Due to the requirement to install the new lighting in occupied space, occupants will be working in proximity to the new lighting prior to full project commissioning. Interim adjustments must be made to prevent short cycling and to resolve customer complaints on a case-by-case basis.

IX. COMMISSIONING

A. Luminaires

1. Contractor must comply with all luminaire commissioning requirements for all spaces as described in the attached specification *[Indicate Attachment # here]* including but not limited to sections on:
   a) Testing, Adjustment and Commissioning
   b) Field Quality Control
   c) Start-up Service
   d) Adjusting
   e) Cleaning
   f) Demonstration and Training

B. Interior Lighting Controls

1. Contractor must comply with all lighting controls commissioning requirements for all spaces as described in the attached specification including but not limited to sections on:
   a) Field Quality Control;
   b) Standard On-Site Start-up, Calibration and Performance Verification
   c) Final design calibration and fine tuning with design team and GSA (and independent commissioning agent if provided by GSA)
   d) Verification of similar spaces by independent commissioning agent
   e) Training of GSA Personnel

X. RECORD DOCUMENTS

A. As-Built Documents

Submit the following within 30 calendar days of completion of work:

1. 'As-Built' Record Documents: Drawings showing the actual installed luminaires, lamps, ballasts, components and control equipment, including wiring, control device identification, schedules of control functions, and sequence of operation.
2. 'As-Built' reflective ceiling plans shall be included indicating fixture and fixture types with a lighting schedule. The drawings shall include all pertinent information to adequately understand the fixture type installed. Ceiling heights shall be indicated for all rooms.
3. Software and Firmware Operational Documentation.
4. Software operating and upgrade manuals.
5. Program Software Backup: On an optical compact disc or other format requested by the GSA, complete with data files.
6. Device address list, when applicable.
7. Printout of software application and graphic screens.
8. Software Upgrade Kit: For GSA to use in modifying software to upgrade and to allow system expansion.
9. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

B. Operation and Maintenance Data

Submit the following within 30 calendar days of completion of work:

1. Submit operation and maintenance data for all luminaires including replacement part numbers. After approval by GSA, this manual will be kept on site for reference use by facility maintenance personnel. Transfer of the document will include a thorough walk-through and demonstration of equipment by contractor for facility personnel, and the designer/specifier. The Contractor shall schedule transfer. The Contractor shall assemble and submit, in bound 8.5 by 11 inches (216mm x 279mm) format, an Operation and Maintenance Manual that includes the following:
    a) A chart clearly documenting the luminaire, lamp and ballast actually installed for each luminaire type, with product designations sufficient for reordering new product and components to match those installed.
    b) A current list of lighting distributors, manufacturers and manufacturer's representatives, (for the purposes of replacement, reordering or trouble-shooting). This list shall be keyed to the list of luminaires, lamps and ballasts, so that the GSA has a name,

address and phone number of at least two (2) contacts for each product or component.

c) Shop drawings, technical data sheets, product technical documents, installation instructions, cut sheets, operating instructions, calibration instructions, and troubleshooting guides in the installation, including but not limited to lamps, ballasts and lighting control devices.

d) Color-coded as-built drawings showing all lamp and ballast types, to facilitate replacement.

2. Submit operation and maintenance data for all control system components including replacement part numbers. See Lighting Control Specification for additional requirements.

a) Software operating and maintenance manuals.

b) Factory presets and adjustment options of group/scene preset controls, adjustable fade rates, and fade overrides.

c) Operation of adjustable zone controls.

d) Testing and adjusting of emergency lighting and night light features.

e) Record of all presets and calibration settings established during system commissioning.

XI. SPARE PARTS

Within 15 days of completion of work, furnish the following stockage to the GSA:

A. Luminaires

1. Furnish 5 percent spare lamps with a minimum of one spare lamp of each type.
2. Furnish 5 percent spare ballasts of each type with a minimum one spare ballast of each type.

B. Lighting Controls

1. Software: One CD-ROM version of the lighting control operating software. Provide a backup disk of the control system upon completion of all testing and commissioning of the system.
2. Controllers, Interfaces, Power Supplies: One of each type installed.
3. Load Relays and dimmers: Equal to (5) five percent of amount installed, but no fewer than two relays.
4. Fuses: Equal to (5) five percent of amount installed for each size installed, but no fewer than (3) three.
5. Dimming Ballasts: Equal to (5) five percent of amount installed for each lamp, but no fewer than (2) two ballasts of each type.

6. Remote Controllers: (2) Two units with cradles.
7. Sensors: Equal to (5) five percent of amount installed, but no fewer than (2) two for each installed type.

XII. TRAINING

A. Training at Time of Mock-up

When at least one mockup has been completed but before proceeding to larger scale work, the Contractor shall provide 8 hours of training to maintenance staff, on site, to include use and configuration of software, and hardware and software troubleshooting and maintenance. In addition the Contractor shall at this time provide 2 hours of training to building management personnel, to include system overview and use of the software.

B. Training at Completion of Work

On completion of work, provide an additional 8 hours of on-site training for maintenance personnel, to include use and configuration of software, and hardware and software troubleshooting and maintenance.

C. Training Requirements

1. Engage a factory-authorized engineer or technician to perform training.
2. Training must include interpreting and using monitoring displays and in configuring and using software and reports.
3. Training must use the latest versions of software in use at the site.
4. Video tape or film the training sessions and provide same to GSA for permanent record, in DVD or electronic format established by the GSA.
5. Contractor must comply with all training requirements as described the Specifications, *[Indicate Attachment # here.]*

XIII. SPECIAL WARRANTY REQUIREMENTS

A. Additional Requirements Beyond FAR 52.246-21

1. 5 years parts and labor warranty on ballasts, and controls hardware and software;
2. 3 years parts and labor warranty on lamps;
3. Controls software warranty must include telephone support and software upgrades during the period of the warranty, to include ability to remotely access the system for troubleshooting (GSA will provide communication channel for access);
4. For building interior lighting fixtures and parking garage fixtures, in lieu of labor response to warranty calls for lamps and ballasts, the Contractor may pay a labor allowance of not less than $15 per lamp or ballast needing replacement during the warranty period, such payment

to be made to either GSA or a GSA designated support contractor. For exterior fixtures (e.g. parking lot) the Contractor shall arrange for labor.

5. Make up to three additional site visits of up to 8 hours duration during the first year after completion, to assist maintenance personnel in adjusting controls and software, for additional training, and other activities as needed by GSA.

End of Scope of Work